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Environmental benign graphene quantum dots embedded halloysite nanotubes as high performance super capacitor electrode material

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There is a demanding need for energy storage alternatives materials that provide new solutions for environmental concerns in emerging technologies as well as high capacitance value over a long cyclic period. We are reporting an environmental friendly nanocomposite of halloysite-graphene quantum dots (HNT-GQD) synthesized by a newly developed method to provide increased charge storage sites and allow fast charge transport for supercapacitor application. The HRTEM images show that the 5-10 nm sized GQDs are homogeneously distributed on the surface of Halloysite which resulted in increased utilization efficiency of GQDs. The combination of different physical and chemical properties of Halloysite and GQD, like high ion storage density, surface area, rapid ion transport etc, makes the HNT-GQD to high specific capacitance in neutral electrolyte solution, Na₂SO₄ with energy density of 50.03 Wh/kg and also excellent capacitance retention after 5000 charge-discharge cycles. These performance features are superior among those reported for halloysite or GQD based supercapacitors, making it a promising candidate for next generation, environmental friendly and high performance electrochemical energy storage material.

Biography

Akhilesh Babu Ganganboina studied Biotechnology in Vellore Institute of Technology, India where he obtained his Masters degree in 2012. Then he worked at Strand Life Sciences and in 2015 moved to National Tsing Hua University, Taiwan, where he now is pursuing PhD degree in department of Biomedical Engineering and Environmental Sciences under the guidance of Prof. RA Doong. His research interests lie in nanomaterial fabrication and application of energy and sensing.

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